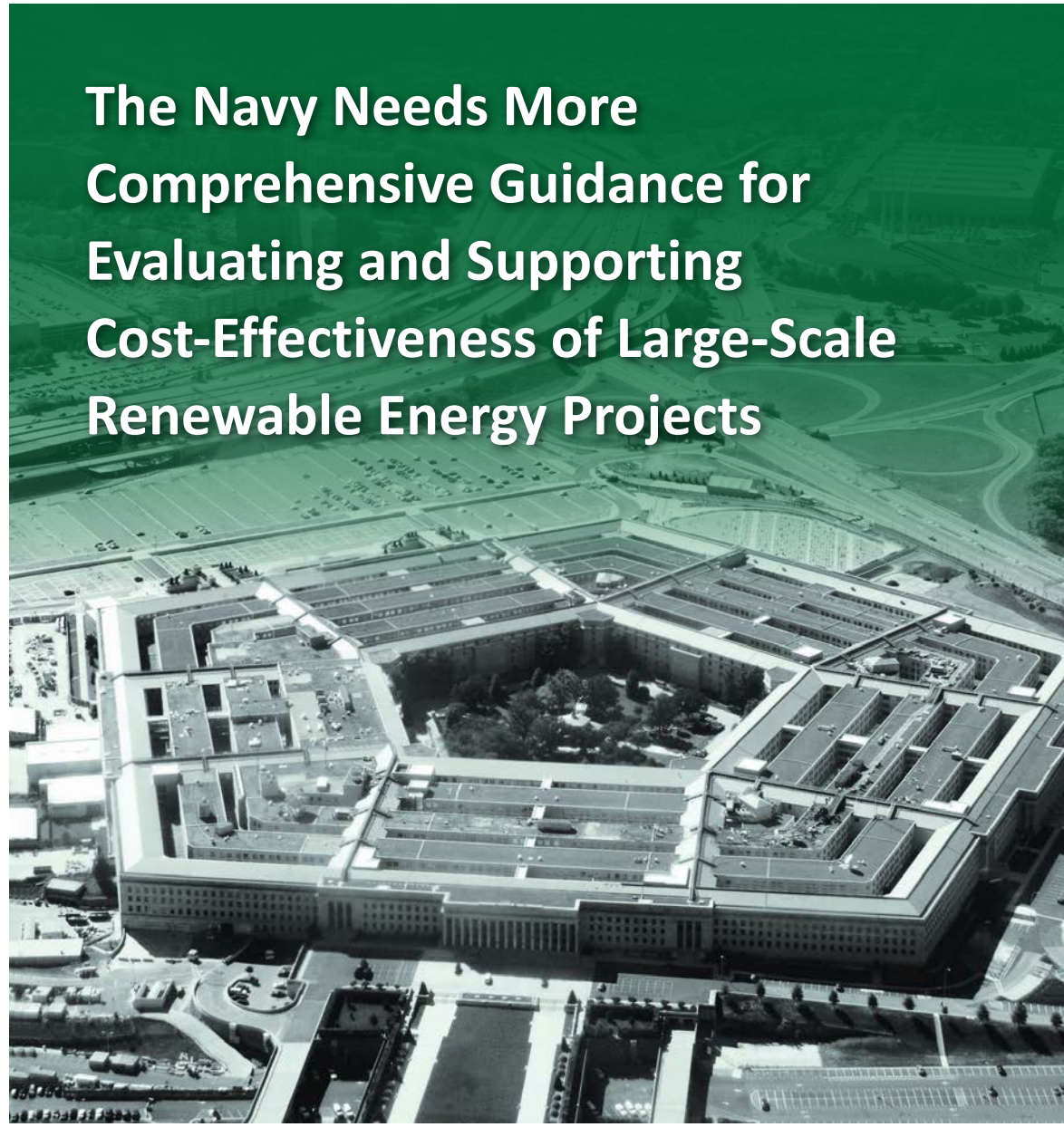


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INSPECTOR GENERAL

U.S. Department of Defense

AUGUST 25, 2016



The Navy Needs More Comprehensive Guidance for Evaluating and Supporting Cost-Effectiveness of Large-Scale Renewable Energy Projects

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Results in Brief

The Navy Needs More Comprehensive Guidance for Evaluating and Supporting Cost-Effectiveness of Large-Scale Renewable Energy Projects

August 25, 2016

Objective

Our audit objective was to determine whether the U.S. Navy was adequately assessing the cost-effectiveness of large-scale renewable energy projects in the U.S. Pacific Command area of responsibility.

Finding

Navy personnel conducted cost-effectiveness assessments for the three U.S. Pacific Command large-scale renewable energy projects included in our audit: Solar Multiple Award Contract (Hawaii), Guam Photovoltaic Renewable Energy, and West Loch Photovoltaic Power (Hawaii). However, Navy personnel could not provide adequate documentation to support the assumptions and calculations made in their assessments. Without that documentation, we could not determine the accuracy of the assessments.

Navy personnel could not support the assumptions and calculations made in their assessments because Navy guidance does not include specific steps for evaluating the cost-effectiveness of renewable energy projects and does not require that supporting documentation be maintained. As a result, the Navy lacks assurance that cost-effectiveness assessments for its large-scale renewable energy projects are accurate, and that appropriate investment decisions are made.

Recommendations

We recommend that the Assistant Secretary of the Navy for Energy, Installations, and Environment:

- develop new, or modify existing, Navy guidance to include comprehensive steps to evaluate and document the cost-effectiveness assessments for large-scale renewable energy projects; and
- once new or modified guidance is issued, determine whether approved renewable energy projects are cost-effective based on those policies and procedures, and take appropriate action based on that determination.

Management Comments and Our Response

The Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment, responding for the Assistant Secretary of the Navy for Energy, Installations, and Environment, agreed with the recommendations. However, the Principal Deputy's responses only partially addressed the recommendation to develop new, or modify existing, Navy guidance. Specifically, his comments did not indicate that the updated guidance would include comprehensive steps to evaluate and document the cost-effectiveness assessments for large-scale renewable energy projects. We request that the Assistant Secretary of the Navy for Energy, Installations, and Environment provide additional comments on how this recommendation will be fully addressed.

The Principal Deputy's responses addressed all the specifics of the recommendation to determine whether approved renewable energy projects are cost-effective based on new or



Results in Brief

The Navy Needs More Comprehensive Guidance for Evaluating and Supporting Cost-Effectiveness of Large-Scale Renewable Energy Projects

Management Comments (cont'd)

modified guidance and to take appropriate action based on that determination. The Principal Deputy stated that the Department of the Navy plans to establish parameters for a later review of renewable energy projects to provide data for analytical or business improvements. We obtained clarification from an official with the Assistant Secretary of the Navy for Energy, Installations, and Environment, who stated that the Department of the Navy will oversee its renewable energy projects, including a review of renewable energy projects to confirm that the projects are cost-effective, and consider a full range of options if the Department of the Navy determines that any executed renewable energy projects are no longer in the best interest of the Government. No further comments are required for this recommendation.

We request that the Assistant Secretary of the Navy for Energy, Installations, and Environment provide comments on the other recommendation by September 23, 2016. Please see the Recommendations Table on the following page.

Recommendations Table

Management	Recommendations Requiring Comment	No Additional Comments Required
Assistant Secretary of the Navy for Energy, Installations, and Environment	1.a	1.b

Please provide Management Comments by September 23, 2016.





**INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
4800 MARK CENTER DRIVE
ALEXANDRIA, VIRGINIA 22350-1500**

August 25, 2016

**MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY FOR ENERGY, INSTALLATIONS,
AND ENVIRONMENT**

**SUBJECT: The Navy Needs More Comprehensive Guidance for Evaluating and Supporting
Cost-Effectiveness of Large-Scale Renewable Energy Projects
(Report No. DODIG-2016-130)**

We are providing this report for review and comment. The Navy lacks comprehensive guidance for evaluating cost-effectiveness assessments for large-scale renewable energy projects, and for supporting all assumptions made and calculations performed during the assessments. As a result, the Navy lacks assurance that the cost-effectiveness assessments are accurate, and that appropriate investment decisions are made. We conducted this audit in accordance with generally accepted government auditing standards.

We considered management comments on a draft of this report when preparing the final report. DoD Instruction 7650.03 requires that recommendations be resolved promptly. Comments from the Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment, responding for the Assistant Secretary of the Navy for Energy, Installations, and Environment, partially addressed Recommendation 1.a and fully addressed Recommendation 1.b. Therefore, we request that the Assistant Secretary of the Navy for Energy, Installations, and Environment provide additional comments on Recommendation 1.a by September 23, 2016.

Please send a PDF file containing your comments to audrco@dodig.mil. Copies of your comments must have the actual signature of the authorizing official for your organization. We cannot accept the /Signed/ symbol in place of the actual signature. If you arrange to send classified comments electronically, you must send them over the SECRET Internet Protocol Router Network (SIPRNET).

We appreciate the courtesies extended to the staff. Please direct questions to me at (703) 699-7331 (DSN 449-7331).

A handwritten signature in black ink, reading "Carol N. Gorman".

Carol N. Gorman
Assistant Inspector General
Readiness and Cyber Operations

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Introduction

Objective

Our audit objective was to determine whether the U.S. Navy was adequately assessing the cost-effectiveness of large-scale renewable energy projects in the U.S. Pacific Command (USPACOM) area of responsibility (AOR). See Appendix A for a discussion of our scope and methodology and prior audit coverage.

Background

Since 2005, Executive orders, public laws, and DoD policies have required the DoD to invest in cost-effective renewable energy sources and effectively develop renewable energy projects.¹ For example, in October 2006, Congress directed the DoD to produce or procure 25 percent of its total facility energy from renewable sources by 2025. Additionally, DoD guidance² states that the DoD is committed to creating opportunities for renewable energy technologies and will purchase electricity generated from renewable sources—such as solar, wind, geothermal, and biomass³—when it is life cycle cost-effective to enhance energy flexibility. Navy guidance⁴ states that the Navy will integrate mission-compatible and cost-effective renewable energy sources. The Navy Renewable Energy Program Office (REPO) “Messaging Communications Plan,” October 2014, defines renewable energy as cost-effective if costs are at or below the cost of brown power⁵ and defines large-scale renewable projects as energy projects that produce 10 megawatts or greater of renewable energy.

Navy Energy Priorities and Goals

In October 2009, the Secretary of the Navy established the following five energy goals:

1. consume 50 percent of total Navy energy from alternative sources by 2020;
2. produce at least 50 percent of shore-based energy requirements from alternative sources by 2020;

¹ Public Law 109-58, “Energy Policy Act of 2005,” Section 203, “Federal Purchase Requirement,” August 8, 2005; Executive Order 13514, “Federal Leadership in Environmental, Energy, and Economic Performance,” October 5, 2009 (revoked by Executive Order 13693, “Planning for Federal Sustainability in the Next Decade,” March 19, 2015); and DoD Directive 4180.01, “DoD Energy Policy,” April 16, 2014.

² DoD Instruction 4170.11, “Installation Energy Management,” December 11, 2009 (Incorporating Change 1, March 16, 2016).

³ Biomass is any organic matter that is renewable, including agricultural crops and animal waste.

⁴ Chief of Naval Operations Instruction 4100.5E, “Shore Energy Management,” June 22, 2012.

⁵ The Department of the Navy Strategy for Renewable Energy, October 2012, defines brown power as power generated from traditional fossil fuels.

3. reduce petroleum use in the commercial vehicle fleet by 50 percent;
4. demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016;⁶ and
5. evaluate energy factors when awarding contracts for systems and buildings.

The Navy reported that in October 2012, it began an aggressive renewable energy strategy to deploy one gigawatt of renewable energy on or near its installations. The Navy's one gigawatt strategy is designed to support the achievement of goal 2 above, as well as statutory and policy mandates.

Renewable Energy Program Office

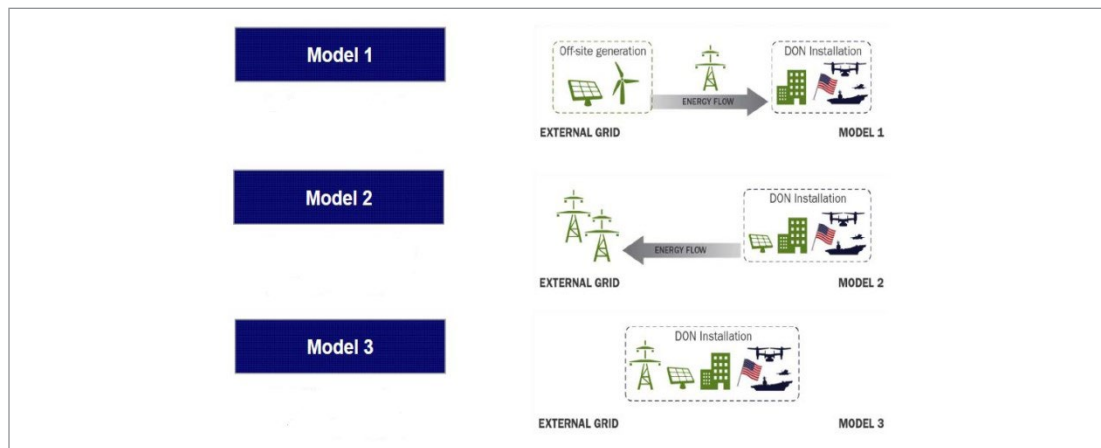
The Secretary of the Navy established REPO in May 2014. REPO receives tasks from the Office of the Assistant Secretary of the Navy for Energy, Installations, and Environment to execute energy strategy and is the central management office for Navy renewable energy. REPO's mission is to identify cost-effective renewable energy projects to help fulfill the Secretary of the Navy's goals, and to support statutory and policy mandates for renewable energy.

REPO categorizes each Navy renewable energy project as one of three model types, based on the location of the energy generation source and the energy consumer (Figure). For each model, energy generation sources are owned or developed, and financed by a third party.⁷ Model 1 projects are Navy procurement of renewable energy from an off-base generation source for on-base consumption. Model 2 projects are lease-type agreements in which a third party develops an on-base generation source for off-base consumption. Model 2 projects can provide the Navy with access to affordable energy during a grid outage. Model 3 projects are Navy procurement of renewable energy from a third-party-operated, on-base generation source for on-base consumption. For Model 3 projects, the Navy provides the land through leases and licenses.

⁶ The Green Strike Group is made up of nuclear vessels and ships powered by biofuels. The Green Strike Group participated in the 2012 Rim of the Pacific Exercise—a multinational maritime exercise in Hawaii.

⁷ DoD's "Annual Energy Management Report Fiscal Year 2014," May 2015, defines third party as non-Governmental.

Figure. REPO Project Development Models



Source: The Department of the Navy

REPO personnel obtain assistance from the Naval Facilities Engineering Command (NAVFAC) in planning, developing, and executing large-scale renewable energy projects using various statutory authorities. REPO uses the following statutory authorities to execute the three project models:

- Models 1 and 3—Section 2922a, title 10, United States Code, “Contracts for Energy or Fuel for Military Installations,” and Federal Acquisition Regulation Part 41, “Acquisition of Utility Services;” and
- Model 2—Section 2667, title 10, United States Code, “Leases: Non-Excess Property of Military Departments and Defense Agencies.”

USPACOM Large-Scale Renewable Energy Projects

From 2012 through 2015, the Navy initiated six large-scale renewable energy projects in the USPACOM AOR. Of the six projects, two were located in Guam and four in Hawaii. We focused on the Solar Multiple Award Contract (Hawaii),⁸ Guam Photovoltaic⁹ Renewable Energy,¹⁰ and West Loch Photovoltaic Power (Hawaii)¹¹ projects because the other three projects were still in the concept development phase. See Table 1 for the Navy’s renewable energy projects reviewed by location, model type, and status as of May 2016.

⁸ Includes Joint Base Pearl Harbor-Hickam, Marine Corps Base Hawaii (Kaneohe Bay), and Marine Corps Base Hawaii (Camp Smith).

⁹ Photovoltaic pertains to the direct conversion of light to electricity.

¹⁰ Includes Naval Support Activity Andersen and Naval Base Guam.

¹¹ Includes Joint Base Pearl Harbor-Hickam.

Table 1. Navy's Renewable Energy Projects Reviewed in USPACOM AOR

Project	Model No.	Status
Solar Multiple Award Contract – Hawaii	3*	Ongoing—contract awarded July 11, 2014. Third party has begun construction but no energy has been generated.
Guam Photovoltaic Renewable Energy – Guam	2	The Navy is in lease negotiations.
West Loch Photovoltaic Power – Hawaii	2	The Navy is in lease negotiations.

* This project predated the REPO model definition, but Navy personnel stated that this project (in which a contract was awarded) is similar to Model 3 projects.

Review of Internal Controls

DoD Instruction 5010.40¹² requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended, and to evaluate the effectiveness of the controls. We identified a Navy internal control weakness. Specifically, the Assistant Secretary of the Navy for Energy, Installations, and Environment lacked guidance needed to ensure that cost-effectiveness assessments for large-scale renewable energy projects in the USPACOM AOR were adequately supported. We will provide a copy of the report to the senior official responsible for internal controls in the Navy.

¹² DoD Instruction 5010.40, "Managers' Internal Control Program Procedures," May 30, 2013.

Finding

Cost-Effectiveness Assessed, But Not Adequately Supported

Navy personnel conducted cost-effectiveness assessments for the three USPACOM large-scale renewable energy projects included in our audit: Solar Multiple Award Contract (Hawaii), Guam Photovoltaic Renewable Energy, and West Loch Photovoltaic Power (Hawaii). However, Navy personnel could not provide adequate documentation to support the assumptions and calculations made in their assessments. Without that documentation, we could not determine the accuracy of the assessments. Navy personnel could not support the assumptions and calculations made in their assessments because Navy guidance does not include specific steps for evaluating the cost-effectiveness of renewable energy projects and does not require that supporting documentation be maintained. As a result, the Navy lacks assurance that cost-effectiveness assessments for its large-scale renewable energy projects are accurate, and that appropriate investment decisions are made.

Cost-Effectiveness Determination

DoD and Navy guidance did not include a formal written definition of cost-effectiveness for large-scale renewable energy projects or include formal detailed steps for assessing cost-effectiveness for each model type. REPO personnel stated that they determined cost-effectiveness for each model type as follows:

- Models 1 and 3—project is cost-effective if the total cost of power purchased over the term of the contract is at or below the expected cost of brown power.
- Model 2—project is cost-effective if the consideration provided (in-kind or cash payments) is greater than or equal to the fair market value of the leased land.

Cost-Effectiveness Assessments

Navy personnel conducted cost-effectiveness assessments for the Solar Multiple Award Contract (Hawaii), Guam Photovoltaic Renewable Energy, and West Loch Photovoltaic Power (Hawaii). However, Navy personnel could not provide adequate documentation to support the assumptions and calculations made in their assessments. Without that documentation, we could not determine the accuracy of the assessments.

Navy personnel could not provide adequate documentation to support the assumptions and calculations made in their assessments.

Solar Multiple Award Contract

NAVFAC personnel assessed the cost-effectiveness of the Solar Multiple Award Contract (Model 3) by comparing the contractor-proposed cost of electricity from photovoltaic systems¹³ over a 25-year contract term to the expected cost of brown power over the same period. To support the cost-effectiveness assessment, REPO personnel provided an economic analysis report that identified a net present value (NPV)¹⁴ cost savings of \$62 million to \$76.9 million, based on a minimum of 26,989,351 kilowatt-hours¹⁵ and a maximum of 33,500,000 kilowatt-hours of electricity produced¹⁶ annually over a 25-year contract term (see Table 2).

Table 2. NPV Cost Savings based on Minimum and Maximum Kilowatt-Hour Produced for Solar Multiple Award Contract

	Brown Power Cost (NPV)	Photovoltaic Systems Electricity Cost (NPV)	Total Savings (NPV)
Minimum Production (26,989,351 kilowatt-hours)	\$225.5	\$163.4	\$62.0
Maximum Production (33,500,000 kilowatt-hours)	\$279.8	\$202.9	\$76.9

* Table entries are in million and rounded to the nearest tenth. Totals may not equal the actual sum because of rounding.

¹³ Photovoltaic systems are solar electric systems made up of several solar cells that convert sunlight to electricity.

¹⁴ NPV is a calculation used to determine the value, or net benefit, over the lifetime of a particular project. NPV is based on the yearly cash flow (after any initial investment) and an applied discount rate, which are used to convert the project cost to current dollar value.

¹⁵ According to REPO personnel, the minimum kilowatt-hours represents less than 5 percent of the Navy’s total energy load.

¹⁶ The minimum kilowatt-hours was a negotiated amount that the contractor agreed to produce and the Navy agreed to purchase, whether or not the Navy consumed the electricity. The maximum kilowatt-hours was a forecasted maximum production of the photovoltaic systems for Navy use.

The photovoltaic systems electricity cost for the minimum and maximum kilowatt-hours¹⁷ was based on electricity pricing negotiated between the contractor and NAVFAC personnel. NAVFAC personnel calculated the brown power cost for the first year of the contract by multiplying the minimum or maximum kilowatt-hours by a baseline kilowatt-hour rate. According to the economic analysis report, the baseline rate was computed by escalating¹⁸ the 2013 kilowatt-hour rate to a 2016 rate (year 1 of the contract). NAVFAC personnel calculated the brown power cost for additional contract years by multiplying the minimum or maximum kilowatt-hours by an annually escalated kilowatt-hour rate. REPO personnel provided FY 2013 utility bills and spreadsheets with historical electricity consumption data to support the 2013 baseline kilowatt-hour rate of 0.228 and the minimum and maximum kilowatt-hours. Although the bills and spreadsheets supported the 2013 baseline kilowatt-hour rate, they did not support how NAVFAC personnel calculated the minimum and maximum kilowatt-hours, which were used to determine the total cost savings. For example, the spreadsheets did not include the minimum (26,989,351) and maximum (33,500,000) kilowatt-hours that were agreed upon by NAVFAC personnel and the contractor. REPO personnel stated that the minimum of 26,989,351 kilowatt-hours was necessary for the contractor to mitigate risk and support project financing; and the maximum of 33,500,000 kilowatt-hours was the maximum amount the Department of the Navy could receive at the negotiated contract price. However, REPO personnel could not provide documentation to support the negotiated minimum or maximum kilowatt-hours.

(FOUO) REPO personnel provided an independent contractor's report to support the 5.7 percent escalation rate used to calculate the kilowatt-hour rates over the 25-year contract term. In the report, the contractor determined the annual escalation rate using a weighted average¹⁹ of energy forecast data from three components.²⁰ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

¹⁷ REPO personnel stated that the minimum and maximum kilowatt-hours were negotiated by the contractor and NAVFAC personnel.

¹⁸ Escalation rate is the rate of change in price for a particular good or service. An independent contractor calculated a fixed annual escalation rate of 5.7 percent for brown power.

¹⁹ Weighted average is the percentage (weight) applied to the three escalation rate components based on their relevance.

²⁰ (FOUO) [REDACTED]

(FOUO) [REDACTED] However, the contractor’s report did not contain a rationale for the weights assigned to each of the components. Therefore, the escalation rate is not adequately supported and could be inaccurate. An inaccurate escalation rate would result in inaccurate rates for brown power kilowatt-hours over the 25-year contract term and, consequently, an inaccurate NPV cost-savings calculation.

The escalation rate is not adequately supported and could be inaccurate.

Guam and West Loch Projects

REPO personnel assessed the cost-effectiveness of the Guam and West Loch projects (Model 2) by comparing the NPV of the contractor-proposed in-kind consideration (IKC)²¹ to the fair market value of the land the Navy planned to lease for each project. The IKC for the Guam project is photovoltaic hardware and energy access²² and for the West Loch project is electrical infrastructure upgrades. In their assessments, REPO personnel determined that the projects were cost-effective because the IKC exceeded the fair market value of the land. See Table 3 for the data used to determine the cost-effectiveness by project.

(FOUO) Table 3. Model 2 Project Cost-effectiveness Data (in millions)

(FOUO)	IKC (NPV)	Land Value (NPV)	Cost-Effective if IKC is Greater Than or Equal to Land Value
Guam	[REDACTED]	[REDACTED]	[REDACTED]
West Loch	[REDACTED]	[REDACTED]	[REDACTED]

(FOUO)

For each project, REPO personnel provided IKC valuation documents, but could not fully support the values used to determine the IKC and land valuation.

²¹ Based on section 2667, title 10, United States Code, “Leases: Non-Excess Property of Military Departments and Defense Agencies,” and The Assistant Secretary of the Navy (Energy, Installations, and Environment) Memorandum, “Shore Energy Policy Real Estate Out-Grant Guidance for Renewable Energy Program Office Model 2 Projects,” IKC is a nonmonetary compensation given in exchange for payment of the leased land. For example, section 2667, title 10, United States Code states maintenance and repairs of property or facilities are types of IKC. REPO personnel also stated that they have not determined the final IKC for either project because they are in negotiations.

²² Based on the REPO personnel document, “Access Valuation: Valuing Partner Commitments to Provide Power from On-Base PV Facilities During Grid Outages,” the value of the energy access is the monetary value assigned to the contractor-provided renewable energy access that the Navy would otherwise have to pay for in the event of a grid outage or other contingency.

Guam Photovoltaic Renewable Energy Project

(FOUO) REPO personnel provided a market rental value document and an “IKC Estimates Valuation Brief”²³ to support the cost-effectiveness determination for the Model 2 Guam Photovoltaic Renewable Energy project. The market rental value document included values such as a base rent and base rent escalation rate.

REPO personnel provided “The Arizona Standard Solar Lease”²⁴ template as supporting documentation for the base rent and base rent escalation rate. Although the Arizona template supported the use of a [REDACTED] base rent escalation rate, it did not support the formula used by REPO personnel to calculate the base rent [REDACTED]. Specifically, the Arizona template determined the base rent using gross acreage multiplied by a fixed dollar amount, not total appraised land value. [REDACTED]

(FOUO) [REDACTED]

[REDACTED] REPO personnel provided a list of hardware, hardware unit costs, and the total hardware cost, but could not provide documentation to support the hardware unit costs. REPO personnel also provided a draft document called “Guam IKC: Access Valuation” to support how the energy access value was determined. In that document, REPO personnel calculated the NPV of energy access by multiplying the energy access value by an annually escalated rate, and by a discount rate to discount future cash flows to present dollar value, over the term of the lease. REPO personnel supported the escalation rate, but did not fully support the analysis for the discount rate. For the escalation rate, REPO personnel provided spreadsheets, which showed the numbers used to calculate the escalation rate and

REPO personnel supported the escalation rate, but did not fully support the analysis for the discount rate.

²³ The IKC Estimates Valuation Brief is a slide presentation summarizing the total IKC—with no supporting documentation for the numbers or assumptions used in the calculations.

²⁴ NAVFAC personnel explained that due to limited information on solar leases, they had only the Arizona template to support the base rent escalation rate and base rent for the Guam and Hawaii projects. Additionally, Department of Energy renewable energy subject matter experts confirmed that Arizona and California had the most developed renewable energy industries and would have the best data available to plan future projects.

²⁵ Arizona State Land Department personnel sent the e-mail on July 28, 2016 to REPO personnel and they provided it to us on July 29, 2016.

(FOUO) the U.S. Energy Information Administration²⁶ website used to obtain the numbers. In support of the discount rate, REPO personnel provided a real estate investor survey, which included a range of discount rates²⁷ published by the Appraisal Institute.²⁸ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

West Loch Photovoltaic Power Renewable Energy Project

(FOUO) REPO personnel provided an “IKC Estimates Valuation Brief” and a land value rent schedule to support the cost-effectiveness determination for the Model 2 West Loch Photovoltaic Power Renewable Energy project. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Specifically, to support the electrical infrastructure cost, REPO personnel provided a list of infrastructure upgrades, including quantities and unit costs. REPO personnel stated they estimated the quantities and based the unit costs on industry pricing, but could not provide documentation to support the quantities or the industry pricing.

(FOUO) To support the fair market value of the land, REPO personnel provided a land value rent schedule. The rent schedule showed a calculated fair market value by totaling all rents over the term of the lease. REPO personnel based the individual rent values on a base rent and a base rent escalation rate. As with the Guam Photovoltaic Renewable Energy project, REPO personnel provided “The Arizona Standard Solar Lease” template as supporting documentation for the base rent escalation rate and base rent. The Arizona template supported the use of a [REDACTED] base rent escalation rate, but not the base rent. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] However, the Arizona template did not support the formula used to calculate the base rent [REDACTED]

[REDACTED] Specifically, the Arizona template determined the base rent using gross acreage multiplied by a fixed dollar amount, not total appraised land value. [REDACTED]

[REDACTED]

[REDACTED]

²⁶ The Department of Energy Organization Act of 1977 established the U.S. Energy Information Administration as the primary federal government authority on energy statistics and analysis.

²⁷ The real estate investor survey included discount rate averages ranging from 6.93 percent to 7.83 percent.

²⁸ The Appraisal Institute is a global professional association of real estate appraisers.

(FOUO) [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Navy Guidance Lacks Specificity and Documentation Requirements

Navy guidance does not include detailed steps for evaluating cost-effectiveness of renewable energy projects and does not require that supporting documentation be maintained. The Navy uses multiple policies and procedures when developing large-scale renewable energy projects, including the following:

Navy guidance does not include detailed steps for evaluating cost-effectiveness of renewable energy projects and does not require that supporting documentation be maintained.

- Federal Acquisition Regulation Part 41 prescribes policies, procedures, and contract format for the acquisition of utility services for up to 10 years.
- Defense Federal Acquisition Regulation Supplement Part 217.174 provides contract requirements for multiyear contracts (up to 10 years) used for electricity from renewable sources.
- Memorandum from the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, "Financing of Renewable Energy Projects Policy," provides guidance to DoD Components for energy projects using third-party financing.
- Secretary of the Navy Instruction 11011.47C provides policy for the acquisition, management, and disposal of real property.
- Memorandums from the Department of the Navy Office of the Assistant Secretary of the Navy (Energy, Installations, and Environment) provide guidance for Model 2 projects and guiding principles for National Environmental Policy Act for Renewable Energy Projects.
- NAVFAC Business Management System includes processes for leases, appraisals, site approval, environmental studies, and utility acquisition.
- NAVFAC P-73 Real Estate Procedural Manual is used for leasing of real property and appraisals.

However, these policies and procedures do not include detailed guidance for evaluating cost-effectiveness of large-scale renewable energy projects, such as guidance on:

- identifying a formal, written definition of cost-effectiveness for each model type;
- developing formal steps for assessing cost-effectiveness throughout the project;
- documenting assumptions made during each phase of the project, such as details on conducting a business case analysis, load and resource analysis, and market analysis;
- documenting the basis for concluding that the renewable energy is cost-effective; and
- maintaining project documentation, including support for cost-effectiveness assessments.

Therefore, to ensure that the Navy makes accurate cost-effectiveness assessments of renewable energy projects, the Assistant Secretary of the Navy for Energy, Installations, and Environment should develop new, or modify existing, Navy guidance to include comprehensive and detailed steps to evaluate and document the cost-effectiveness of large-scale renewable energy projects. Comprehensive steps would allow Navy personnel that are not familiar with evaluating the cost-effectiveness of large-scale renewable energy projects to perform the same steps to assess cost-effectiveness of future projects.

No Assurance of Accurate Cost-Effectiveness Assessment

(FOUO) Without comprehensive guidance on how to evaluate and document the cost-effectiveness of large-scale renewable energy projects,



Navy lacked assurance that the cost-effectiveness assessments for the projects were accurate, and that appropriate investment decisions were made.

the Navy lacked assurance that the cost-effectiveness assessments for the projects were accurate, and that appropriate investment decisions were made. For example, the Navy awarded the Solar Multiple Award Contract, a 25-year fixed-rate contract with a \$334.1 million ceiling—a contract that locked the Navy into a fixed rate per kilowatt-hour for the 25-year term—without fully supporting how they determined that the renewable energy project was cost-effective. NAVFAC personnel stated that since the contract is for the purchase of power only, and the Navy will

(FOUO) not own and maintain any of the assets, this contract represented minimal risk. [REDACTED]

(FOUO) [REDACTED]

[REDACTED] Based on our review, the contract did not include a clause for reassessing cost-effectiveness after the project starts generating energy. If a reassessment concluded that a project was not cost-effective and the contract should be terminated, termination liability costs would apply. Per the contract terms for the Solar Multiple Award Contract, termination liability costs range from \$0.4 million to \$74 million for each of the 14 sites if the Navy terminated the contract during the first month the contractor starts selling electricity to the Navy. Given these risks, the Navy should reassess whether approved renewable energy projects are cost-effective based on new or modified guidance, and take appropriate action based on that determination.

Management Comments on the Finding and Our Response

The Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment, responding for the Assistant Secretary of the Navy for Energy, Installations, and Environment, provided technical comments on the report finding. Please see Appendix B for those comments and our response.

²⁹ (FOUO) [REDACTED]

Recommendations, Management Comments, and Our Response

Recommendation 1

We recommend that the Assistant Secretary of the Navy for Energy, Installations, and Environment:

- a. develop new, or modify existing, Navy guidance to include comprehensive steps to evaluate and document the cost-effectiveness assessments for large-scale renewable energy projects; and**

Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment Comments

The Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment, responding on behalf of the Assistant Secretary of the Navy for Energy, Installations, and Environment, agreed. The Principal Deputy stated that the Department of the Navy acknowledges the opportunity to collect the Navy's best practices for assessing the cost-effectiveness of large-scale renewable energy projects financed through third parties in the USPACOM AOR through additional or revised written regulation and policy. This documentation would consolidate information currently available in multiple resources for easy reference, eliminate any perceived uncertainty regarding the definition of cost-effectiveness, and articulate the applicability of existing authorities in the execution of such projects. He also stated that the Department of the Navy will review the Navy and Marine Corps guidance and business processes, paying particular attention to identification of best practices for the execution of large-scale renewable energy projects. The Department of the Navy will also update policy documents based on best practices, ensuring compliance with existing policy from the Office of the Secretary of Defense. The Principal Deputy stated that the Assistant Secretary of the Navy for Energy, Installations, and Environment plans to complete the proposed actions by September 2017.

Our Response

Comments from the Principal Deputy partially addressed the recommendation. While the Principal Deputy stated that the Department of the Navy acknowledges the opportunity to collect the Navy's best practices for assessing the cost-effectiveness of large-scale renewable energy projects and will update policy documents based on Department of the Navy best practices, the comments did not specify that the updated guidance would include comprehensive steps to evaluate and document the cost-effectiveness assessments for large-scale renewable energy projects. We request that the Assistant Secretary of the Navy for Energy, Installations, and Environment provide additional comments on how this recommendation will be fully addressed.

- b. once new or modified guidance is issued, determine whether approved renewable energy projects are cost-effective based on these policies and procedures, and take appropriate action based on that determination.**

Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment Comments

The Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment, responding on behalf of the Assistant Secretary of the Navy for Energy, Installations, and Environment, agreed. The Principal Deputy stated that the Department of the Navy believes its executed contracts and leases for renewable energy projects are cost-effective because the projects were carried out based on the advice of subject-matter experts. He stated that the Department of the Navy acknowledges that under certain circumstances awarded contracts and signed leases for renewable energy projects should be reviewed because the DoD has only recently undertaken alternative financing mechanisms to support the development of renewable energy. The Principal Deputy also stated that as part of the update to relevant instructions, regulations, and policy, the Department of the Navy will establish parameters for a later review of renewable energy projects to provide data for analytical and business process improvements, or both.

Our Response

Although the Principal Deputy agreed with our recommendation, he did not clarify the steps that would be taken for a later review renewable energy projects to provide data for analytical and business process improvements. We received clarification of the comments from an official with the Assistant Secretary of the Navy for Energy, Installations, and Environment, who stated that once the guidance was updated, the Department of the Navy would:

- confirm whether renewable energy projects are cost-effective;
- consider a full range of options if the Department of the Navy determines that the executed renewable energy projects are no longer in the best interest of the Government, including project termination; and
- use criteria prescribed by the Office of the Secretary of Defense and establish parameters for reviewing project cost-effectiveness after contract award or lease signature.

The official added that once the guidance is issued in September 2017, the estimated completion date for further action would be September 2019. Those specific steps meet the intent of the recommendation. Therefore, no further comments are required.

Management Comments on Internal Controls and Our Response

Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment Comments

The Principal Deputy Assistant Secretary of the Navy for Energy, Installations, and Environment, responding for the Assistant Secretary of the Navy for Energy, Installations, and Environment, disagreed with the report's finding that the Navy has an internal control weakness. According to the Principal Deputy, the report's finding does not represent a control deficiency or material weakness as defined by DoD Instruction 5010.40. The Principal Deputy also stated that existing processes for review, approval, and recordkeeping of the Department of the Navy's renewable energy projects are adequate to ensure compliance with applicable statutes and regulations.

Our Response

DoD Instruction 5010.40 requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended, and to evaluate the effectiveness of the controls. In addition, DoD Instruction 5010.40 states that end-to-end processes should be documented to improve DoD efficiencies. The Navy does not have comprehensive guidance for evaluating and supporting the cost-effectiveness of large-scale renewable energy projects and has not fully documented the processes used to support cost-effectiveness analyses. Without comprehensive guidance and documented processes, the Navy lacks assurance that cost-effectiveness assessments for its large-scale renewable energy projects are accurate, and that appropriate investment decisions are made. While we did not identify a material internal control weakness, we consider this lack of guidance a control deficiency³⁰ as defined by DoD Instruction 5010.40.

³⁰ A control deficiency exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to satisfactorily accomplish their assigned functions or inhibits the prevention or detection of misstatements on a timely basis.

Appendix A

Scope and Methodology

We conducted this performance audit from May 2015 through June 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We reviewed Executive orders, public laws, DoD policies, and guidance from the Navy and U.S. Department of Energy to understand the process for determining the cost-effectiveness of large-scale renewable energy projects. We met with various personnel from the Department of Energy, Assistant Secretary of the Navy, NAVFAC, and REPO. We assessed whether Navy personnel had procedures in place to determine the cost-effectiveness of large-scale renewable energy projects through the life of the project.

We obtained the universe of large-scale renewable energy projects in the USPACOM AOR initiated from FY 2012 through FY 2015. As of June 2015, the universe included six large-scale renewable energy projects. Of the six projects, we selected the following three projects to review:

- Solar Multiple Award Contract
- Guam Photovoltaic Renewable Energy
- West Loch Photovoltaic Power

Of the three projects reviewed, the Navy had awarded a contract for one and the other two were in lease negotiations. We did not review the remaining three large-scale renewable energy projects because they were in the concept development stage and the Navy had not performed any cost-effectiveness assessments.

We interviewed Navy personnel to determine the definition of cost-effectiveness for large-scale renewable energy projects and how cost-effectiveness was assessed. In addition, we gathered documentation to determine the adequacy of the cost-effectiveness assessments.

Use of Computer-Processed Data

We used computer-processed data to perform this audit. REPO personnel told us that the data they provided on the cost of brown power for the Solar Multiple Award Contract were from electricity bills generated by the Hawaiian Electric Company and Excel spreadsheets that NAVFAC personnel prepared based on those bills. To test the reliability of the data, we recalculated the baseline kilowatt-hour rate that NAVFAC used in determining the cost of brown power.

REPO personnel provided land value and IKC data for the Guam Photovoltaic Renewable Energy and West Loch Photovoltaic Power Renewable Energy projects. REPO personnel told us that the land value was determined using the market rental value document and the Arizona Standard Solar Lease template. Also, REPO personnel stated that the IKC data used to determine the Guam escalation rate were from the U.S. Energy Information Administration website and Excel spreadsheets of electric power projections that REPO personnel developed from that website. To test the reliability of the land value data, we recalculated the rents over the term of the lease and the base rent escalation rate for the Guam and West Loch projects. We also tested the reliability of the IKC data for the Guam project by recalculating the escalation rate used to determine the net present value of the energy access, which is a component of IKC.

We determined that the data that REPO personnel provided and we recalculated were sufficiently reliable for purposes of this report.

Use of Technical Assistance

We consulted with the DoD Office of Inspector General Technical Assessment Division to determine methods to assess cost-effectiveness of large-scale renewable energy projects. We also received assistance from the DoD Office of Inspector General Quantitative Methods Division to review the independent contractor report for the Solar Multiple Award Contract and the real estate investor survey for the Guam Photovoltaic Renewable Energy Project.

Prior Coverage

During the last 5 years, the Government Accountability Office (GAO), Department of Defense Inspector General (DoD IG), Army Audit Agency, Naval Audit Service, and Air Force Audit Agency issued 9 reports on renewable energy projects. Unrestricted GAO reports can be accessed at <http://www.gao.gov>. Unrestricted DoD IG reports can be accessed at <http://www.dodig.mil/pubs/index.cfm>. Unrestricted Army Audit Agency reports can be accessed from .mil and gao.gov domains at <https://www.aaa.army.mil/>. Naval Audit Service reports are not

available over the Internet. Unrestricted Air Force Audit Agency reports can be accessed from <https://www.efoia.af.mil/palMain.aspx> by clicking on Freedom of Information Act Reading Room and then selecting audit reports.

GAO

GAO Report No. 12-401, "Renewable Energy Project Financing: Improved Guidance and Information Sharing Needed for DoD Project-Level Officials," April 4, 2012

DoD IG

D-2011-106, "The Department of the Navy Spent Recovery Act Funds on Photovoltaic Projects That Were Not Cost-Effective," September 22, 2011

D-2011-108, "Geothermal Energy Development Project at Naval Air Station Fallon, Nevada, Did Not Meet Recovery Act Requirements," September 19, 2011

D-2011-048, "American Recovery and Reinvestment Act Projects – 'Facility Energy Improvements' and 'Wind Turbine and Photovoltaic Panels' at Fort Wainwright, Alaska," March 7, 2011

Army

A-2015-0105-IEE, "Audit of Large-Scale Renewable Energy Projects—Project Assessment," September 30, 2015

A-2014-0114-IEE, "Performance of Renewable Energy Projects," September 29, 2014

Navy

N2014-0037, "Validation and Use of Navy Energy-Return on Investment Scores," August 21, 2014

N2013-0035, "Validation and Use of Life-Cycle Cost Analysis within the Marine Corps Energy Investment Program," June 28, 2013

Air Force

F2014-0003-O20000, "Energy Project Management," January 13, 2014

Appendix B

Management Comments on the Finding and Our Response

Table 4. Management Comments on the Finding and Our Response

(FOUO)				
Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
Solar Multiple Award Contract				
1.	7	<p>“NAVFAC personnel calculated the brown power cost for the first year of the contract by multiplying the minimum or maximum kilowatt-hours by a baseline kilowatt-hour rate. According to the economic analysis report, the baseline rate was computed by escalating the 2013 kilowatt-hour rate to a 2016 rate (year 1 of the contract). NAVFAC personnel calculated the brown power cost for additional contract years by multiplying the minimum or maximum kilowatt-hours by an annually escalated kilowatt-hour rate. REPO personnel provided FY 2013 utility bills and spreadsheets with historical electricity consumption data to support the 2013 baseline kilowatt-hour rate of 0.228 and the minimum and maximum kilowatt-hours. Although the bills and spreadsheets supported the 2013 baseline kilowatt-hour rate, they did not support how NAVFAC personnel calculated the minimum and maximum kilowatt-hours, which were used to determine the total cost savings.”</p>	<p>The final contract minimum and maximum kilowatt hours were negotiated by the contractor and the Government during the exclusive negotiation process. They were not set solely by the Government.</p> <ul style="list-style-type: none"> • A minimum amount of kilowatt-hours are necessary for the developer to mitigate its risk and support project financing. <ul style="list-style-type: none"> – The FY 2013 utility bills and spreadsheets with historical electricity consumption data support the agreed upon minimum because the DON [Department of the Navy] evaluated its risk by comparing the minimum kilowatt-hours discussed via the negotiation process to the FY 2013 utility bills and historical electricity consumption data to determine the percentage of the annual electricity load represented by the minimum kilowatt-hours. – The specified minimum represented less than 5% of the annual electricity load, which meant the Navy’s electricity demand would have to decrease 95% from FY 2013 levels for the contractual minimum kilowatt-hours to present a risk to the DON. • A maximum amount of kilowatt-hours is a function of the size and production capacity of the installed solar photovoltaic and therefore the maximum amount that the DON could receive at the negotiated contract price. <ul style="list-style-type: none"> – Documentation of parameters affecting the maximum solar photovoltaic system sizes were part of the design requirements and covered in the terms of the contract previously provided to the DoD IG. 	<p>On pages 6 and 7, footnotes 15-17, we acknowledge that REPO personnel:</p> <ul style="list-style-type: none"> • stated that the minimum and maximum kilowatt-hours were negotiated by the contractor and NAVFAC personnel, • stated that the minimum kilowatt-hours represents less than 5 percent of the Navy’s energy load, • provided utility bills and spreadsheets with historical electricity consumption data to support the minimum, and stated that the maximum kilowatt-hours was a forecasted maximum production of the photovoltaic systems for Navy use. <p>However, the utility bills and spreadsheets that REPO personnel provided did not include or support the negotiated minimum or maximum kilowatt-hours.</p>

(FOUO)

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO) Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
2.	7	<p>(FOUO) [REDACTED]</p> <p>However, the contractor's report did not contain a rationale for the weights assigned to each of the components. Therefore, the escalation rate is not adequately supported and could be inaccurate. An inaccurate escalation rate would result in inaccurate rates for brown power kilowatt-hours over the 25-year contract term and, consequently, an inaccurate NPV cost-savings calculation."</p>	<p>The overall weights used by the independent contractor, in the judgment of the Navy, evenly balance forecasted and historical data. The use of qualitative judgment and subjective data, in estimating costs and benefits is recognized by Office of Management and Budget (ref: Office of Management and Budget Circular A-94 (paragraph 9.a.), Office of Management and Budget Circular A-11 (paragraph 51.2)).</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>(FOUO) [REDACTED]</p> <p>Given the inherent uncertainty in estimating the behavior of future prices, the DON believes its approach was reasonable and consistent with Office of Management and Budget guidance. Furthermore, in the 2922a package documentation previously provided to the DoD IG, the Navy acknowledged the sensitivity of its cost-savings calculation to the 5.7% escalation rate and identified the minimum escalation rate under which the estimated NPV of cost savings would still be positive and, therefore, cost effective.</p>	<p>(FOUO) We state on page 7 that REPO personnel explained that the escalation rate is based on forecasted and historical data.</p> <p>[REDACTED]</p> <p>Although the Department of the Navy believes its approach for assigning weights to the three factors was reasonable and consistent with Office of Management and Budget Circulars A-94 and A-11, neither Circular addresses assigning weights to determine escalation rates.</p> <p>(FOUO)</p>

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO)				
Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
Guam and West Loch Projects				
3.	8	"The IKC for the Guam project is photovoltaic hardware and energy access and for the West Loch project is electrical infrastructure upgrades."	The IKC for the Guam project is suppositional pending successful negotiations. The draft's definitive characterization of the IKC is premature.	We acknowledge on page 8, footnote 21, that REPO personnel have not determined the final IKC because they are in negotiations.
Guam Photovoltaic Renewable Energy Project				
4.	8-9	<p>(FOUO) "REPO personnel provided a market rental value document and an 'IKC Estimates Valuation Brief' to support the cost-effectiveness determination for the Model 2 Guam Photovoltaic Renewable Energy project. The market rental value document included values such as a base rent and base rent escalation rate. [REDACTED]</p> <p>[REDACTED] REPO personnel provided 'The Arizona Standard Solar Lease' template as supporting documentation for the base rent and base rent escalation rate. Although the Arizona template supported the use of a [REDACTED] base rent escalation rate, it did not support the formula used by REPO personnel to calculate the base rent [REDACTED]</p> <p>[REDACTED] Specifically, the Arizona template determined the base rent using gross acreage multiplied by a fixed dollar amount, not total appraised land value. [REDACTED]</p> <p>[REDACTED] If the base rent is inaccurate, the land's fair market value, used to determine cost-effectiveness, will also be inaccurate."</p>	The Arizona State Land Department provided their base rent formula to the Navy in an email. That email has been provided to DoD IG subsequent to issuance of the draft report.	<p>(FOUO) [REDACTED]</p> <p>[REDACTED] We considered this e-mail from an independent source as adequate support for the Arizona State Land Department statement. Therefore, we revised page 9 of the report.</p>

(FOUO)

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO) Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
5.	9	<p>(FOUO) "REPO personnel also provided a draft document called 'Guam IKC: Access Valuation' to support how the energy access value was determined. In that document, REPO personnel calculated the NPV of energy access by multiplying the energy access value by an annually escalated rate, and by a discount rate to discount future cash flows to present dollar value, over the term of the lease. REPO personnel supported the escalation rate, but did not fully support the analysis for the discount rate. For the escalation rate, REPO personnel provided spreadsheets, which showed the numbers used to calculate the escalation rate and the U.S. Energy Information Administration website used to obtain the numbers. In support of the discount rate, REPO personnel provided a real estate investor survey, which included a range of discount rates published by the Appraisal Institute. [REDACTED]</p>	<p>(FOUO) The DON believes that the discount rate used in the evaluation of the Guam project is reasonable and consistent with industry practice. Adjustments to the range of discount rates found in the market for those properties/uses were estimated and applied to consider lessor and lessee risk for a one-time lump sum payment. [REDACTED]</p>	<p>Although the Department of the Navy believes the discount rate used is reasonable and consistent with industry practice, the Department of the Navy did not provide documentation that fully supported the analysis performed to calculate the discount rate.</p>
West Loch Photovoltaic Power Renewable Energy Project				
6.	10	<p>(FOUO) "As with the Guam Photovoltaic Renewable Energy project, REPO personnel provided 'The Arizona Standard Solar Lease' template as supporting documentation for the base rent escalation rate and base rent. The Arizona template supported the use of a [REDACTED] base rent escalation rate, but not the base rent. [REDACTED] However, the Arizona template did not support the formula used to calculate the base rent [REDACTED]</p>	<p>The Arizona State Land Department provided their base rent formula to the Navy in an email. That email has been provided to DoD IG subsequent to issuance of the draft report.</p>	<p>(FOUO) [REDACTED]</p> <p>We considered this e-mail from an independent source as adequate support for the Arizona State Land Department statement. Therefore, we revised page 11 of the report.</p> <p>(FOUO)</p>

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO)				
Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
Navy Guidance Lacked Specificity and Documentation Requirements				
7.	10	<p>"Navy guidance does not include detailed steps for evaluating cost-effectiveness of renewable energy projects and does not require that supporting documentation be maintained."</p>	<p>For Model 1 and 3 projects, DOD Instruction 4170.11, page 16 specifies the form of analysis prescribed by the Office of the Secretary of Defense. With respect to Model 2 projects, NAVFAC P-73 Chapter 16 provides standards for the conduct of appraisals to determine the fair market value. In addition, Office of the Assistant Secretary of the Navy (Energy, Installations, and Environment) memorandum ("Shore Energy Policy Real Estate Out-grant Guidance for Renewable Energy Program Office Model 2 Projects," dated March 31, 2015) discusses valuation of in-kind consideration for renewable energy projects. Federal Acquisition Regulation 4.803 and Secretary of the Navy M-5210.1 provide contract file and document retention policies that require the Contracting Office to maintain all such records.</p>	<p>During the audit, we identified and analyzed DoD Instruction 4170.11; NAVFAC P-73; the Office of the Assistant Secretary of the Navy (Energy, Installations, and Environment) Memorandum; Federal Acquisition Regulation 4.803; and Secretary of the Navy M-5210.1. However, the guidance does not include comprehensive (detailed) steps on how to evaluate and document cost-effectiveness assessments for large-scale renewable energy projects.</p>
8.	11	<p>"However, these policies and procedures do not include detailed guidance for:</p> <ul style="list-style-type: none"> • evaluating cost-effectiveness of large-scale renewable energy projects, such as guidance on: • identifying a formal, written definition of cost-effectiveness for each model type; • developing formal steps for assessing cost-effectiveness throughout the project; • documenting assumptions made during each phase of the project, such as details on conducting a business case analysis, load and resource analysis, and market analysis; • documenting the basis for concluding that the renewable energy is cost-effective; and • maintaining project documentation, including support for cost-effectiveness assessments." 	<p>DOD Instruction 4170.11, at page 16 specifies the meaning and required analysis for cost-effectiveness for Models 1 and 3 projects: "Award determinations shall be based on best value and, where applicable, compared to the applicable utility tariff available under a utility services contract to ensure economic value." Any additional guidance would need to be coordinated with and approved by the Office of the Secretary of Defense. NAVFAC P-73 Chapter 16 provides standards for the conduct of appraisals to determine the fair market value. In addition, Office of the Assistant Secretary of the Navy (Energy, Installations, and Environment) memorandum ("Shore Energy Policy Real Estate Out-grant Guidance for Renewable Energy Program Office Model 2 Projects," dated March 31, 2015) discusses valuation of in-kind consideration for renewable energy projects.</p>	<p>During the audit, we identified and analyzed DoD Instruction 4170.11; NAVFAC P-73; and the Office of the Assistant Secretary of the Navy (Energy, Installations, and Environment) Memorandum. However, the guidance does not include comprehensive (detailed) steps on how to evaluate and document cost-effectiveness assessments for large-scale renewable energy projects.</p>

(FOUO)

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO)				
Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
No Assurance of Accurate Cost-Effectiveness Assessment				
9.	11	“Without comprehensive guidance on how to evaluate and document the cost-effectiveness of large-scale renewable energy projects, the Navy lacked assurance that the cost-effectiveness assessments for the projects were accurate, and that appropriate investment decisions were made.”	DOD Instruction 4170.11 provides guidance on how to evaluate and document the cost-effectiveness of large-scale renewable energy projects. All such assessments are retained in the contract files in accordance with Federal Acquisition Regulation and DON policies on maintenance of contract files and records retention (see Federal Acquisition Regulation 4.803 and Secretary of the Navy M-5210.1).	During the audit, we identified and analyzed DoD Instruction 4170.11, Federal Acquisition Regulation 4.803, and Secretary of the Navy M-5210.1. However, the guidance does not include comprehensive (detailed) steps on how to evaluate and document cost-effectiveness assessments for large-scale renewable energy projects.
10.	12	“For example, the Navy awarded the Solar Multiple Award Contract, a 25-year fixed-rate contract with a \$334.1 million ceiling—a contract that locked the Navy into a fixed rate per kilowatt-hour for the 25-year term—without fully supporting how they determined that the renewable energy project was cost-effective.”	The DON provided the economic analysis, detailed supporting documentation and source data (including utility bills) that concluded the Solar Multiple Award Contract was cost-effective.	Although the Department of the Navy provided an economic analysis and source data (including utility bills), the documents, as explained on page 7, did not support how NAVFAC personnel determined that the Solar Multiple Award Contract was cost-effective. Specifically, the documentation provided by the Navy did not support the negotiated minimum or maximum kilowatt-hours or the escalation rate used. (FOUO)

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO) Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
11.	12	<p>(FOUO) "NAVFAC personnel stated that since the contract is for the purchase of power only, and the Navy will not own and maintain any of the assets, this contract represented minimal risk."</p> <p>(FOUO)</p> <p>(FOUO)</p> <p>(FOUO) "[Footnote 28]"</p>	<p>(FOUO)</p> <p>First DON will enjoy fixed prices on renewable energy in Hawaii for the 25 year contract term. Based on historic energy pricing data (last 15 years), the average energy price escalation rate in Hawaii was 7.5%. The independent contractor report, which is forward-looking, projected an average energy price escalation rate in Hawaii of 5.7%. Actual energy price escalation in Hawaii may be much higher than projected. The contract for the Solar Multiple Award Contract project provides for a 4% energy price escalation rate. Accordingly, the risks of a 25 year contract term are more than matched by the long-term price stability offered by the contract. Second, while the contract requires a minimum level of service, the amount of power provided under the contract is less than 5% of base load at the DON installations. The DON is satisfied that it will consume at least 5% of its current base load power in Hawaii for the 25 year contract term.</p> <p>(FOUO)</p>	<p>(FOUO) We acknowledge on page 13, footnote 29, that</p> <p>In addition, we acknowledge on page 6, footnote 15, that according to REPO personnel the minimum kilowatt-hours represents less than 5 percent of the Navy's energy load.</p> <p>However, basing a long-term, fixed rate on unsupported cost analyses is inherently high risk because of the uncertainty of future pricing. Although, the Navy stated that actual energy price escalation in Hawaii may be higher than projected, it could also be lower than projected.</p> <p>(FOUO)</p>

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO)				
Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
12.	12	"Based on our review, the contract did not include a clause for reassessing cost-effectiveness after the project starts generating energy."	Upon award of the contract and the completion of construction, the DON would be responsible for construction costs in a termination scenario. In other words, these are "sunk" costs. There is no need (or requirement) for a cost-effectiveness analysis after the project starts generating energy because there would be no foreseeable situation in which the DON would terminate the contract based on variations in market price. It should also be pointed out that such a clause could work against the DON's favor if the contractor were similarly allowed to re-assess and revise its prices in the event of an increase in market prices.	<p>Although the Department of the Navy stated there is no foreseeable situation in which the Department of the Navy would terminate the contract based on variations in market price, we disagree. Specifically, the Navy estimated that the FY 2016 brown power rate per kilowatt-hour would be \$0.2693; however, we obtained a January 2016 Hawaiian Electric utility bill for one of the sites included in the contract that showed a kilowatt-hour rate of \$0.1858. If the \$0.1858 rate is used as the 2016 base-year, instead of the \$0.2693 rate, the cost of brown power over the term of the contract would be less expensive than the renewable energy costs – which means the renewable energy contract would not be cost-effective. This is true even if the 5.7 percent annual escalation rate is applied, but the escalation rate is in question because the kilowatt-hour rate actually decreased. If the brown power kilowatt-hour rates continue to decrease, or if they stabilize, the cost savings could be sufficient to offset any "sunk" costs.</p> <p>Additionally, the Department of the Navy stated that a reassessment clause could work against the Department of the Navy, but it could also benefit the Navy in identifying projects that are not cost-effective.</p> <p>(FOUO)</p>

Table 4. Management Comments on the Finding and Our Response (cont'd)

(FOUO) Cmt. #	Page	Draft Report Text	Department of the Navy Technical Comments	Our Response
13.	12	<p>"If a reassessment concluded that a project was not cost-effective and the contract should be terminated, termination liability costs would apply. Per the contract terms for the Solar Multiple Award Contract, termination liability costs range from \$0.4 million to \$74 million for each of the 14 sites if the Navy terminated the contract during the first month the contractor starts selling electricity to the Navy."</p>	<p>It is standard in long term renewable energy contracts that the purchaser of power is responsible for costs of early termination. The likelihood that the Navy would opt to terminate the contract in the first month of commercial operation is nil. Therefore, the statement is meaningless.</p>	<p>As stated in our response to comment number 12, the cost-effectiveness of the contract can change over time and should be reevaluated to ensure the best value to the government – taking into consideration all costs and market variances.</p> <p>(FOUO)</p>

Management Comments

Assistant Secretary of the Navy for Energy, Installations, and Environment



DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

July 22, 2016

MEMORANDUM FOR THE INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

SUBJECT: The Navy Needs More Comprehensive Guidance for Evaluating and
Supporting Cost-Effectiveness of Large-Scale Renewable Energy Projects
(Project No. D2015-D000RA-0195.000)

Our comments on the subject draft Report are attached. These include the Department of the Navy (DON) response to the Report's recommendations and, in addition, technical comments on the draft Report itself.

Renewable energy projects that yield cost savings, guarantee price stability, facilitate improvements to the electrical grid, and reduce the nation's fossil fuel dependence contribute to long-term energy security. Since 2014, the DON has developed and executed a number of cost-effective projects using alternative financing mechanisms that provide direct, tangible benefits to the DON while meeting energy goals set by Congress and the Administration. We concur, with comment, on the draft Report recommendations 1a and 1b, as we acknowledge the opportunity to codify via regulation and policy best practices gained through the execution of these projects.

We disagree, however, with the characterization found within the Report that Navy has "internal control weakness." None of the Report's findings rise to the level of a control deficiency or material weakness as defined in DoD Instruction 5010.40. While we believe there is merit in the codification of the best practices used in assessing the cost-effectiveness of renewable projects in the PACOM AOR, we believe existing processes in place for the review, approval, and record keeping of the DON's renewable energy projects are adequate to ensure compliance with applicable statutes and regulations, for a determination of cost-effectiveness, and for treatment of risk.

Thank you for the opportunity to comment on the subject draft report. My point of contact is [REDACTED]


Steven Iselin
Principal Deputy

Attachments:
As stated

Copy to:
OASD (EI&E)
NAVJSGEN
REPO
NAVFAC

Assistant Secretary of the Navy for Energy, Installations, and Environment (cont'd)

DoD IG Draft Report: "The Navy Needs More Comprehensive Guidance for Evaluating and Supporting Cost-Effectiveness of Large-Scale Renewable Energy Projects"
Project No. D2015-D000RA-0195.000
DON Technical Comments

The Navy's responses to the findings and recommendations of the Department of Defense Inspector General's (DoD IG's) subject Draft Report are provided below.

Technical comments on the remainder of the report are provided as Attachment 1.

Recommendation 1: We recommend that the Assistant Secretary of the Navy for Energy, Installations and Environment:

- a. develop new, or modify existing, Navy policies and procedures to include comprehensive procedures to evaluate and document the cost-effectiveness of large-scale renewable energy projects; and

Response: Concur with comment. The DON acknowledges the opportunity to codify DON best practices for assessing the cost effectiveness of large-scale renewable energy projects financed through third-parties in the PACOM AOR via additional or revised written regulation and policy. Such documentation would consolidate information currently available in multiple resources for easy reference, eliminate any perceived ambiguity regarding the definition of cost-effectiveness, and articulate the applicability of existing authorities in the execution of such projects.

Actions DON will take:

1. Review Navy and Marine Corps guidance and business processes, paying particular attention to identification of best practices as it pertains to the execution of financed large-scale renewable energy projects. Update relevant instructions, other regulations and policy documents based on DON best practices in accordance with existing policy from the Office of the Secretary of Defense (OSD) and subject to any additional OSD guidance that may be forthcoming. (Planned completion: Sep 2017)
- b. once new or modified policies and procedures are issued, determine whether approved renewable energy projects are cost-effective based on these policies and procedures, and take appropriate action based on that determination.

Response: Concur with comment. The DON is confident that all of its executed contracts and leases for financed renewable energy projects are cost-effective. These projects were executed based on the expertise of subject matter professionals across several respective fields who have applied the best information available to minimize risk while increasing the DON's energy

Attachment 1

Assistant Secretary of the Navy for Energy, Installations, and Environment (cont'd)

security. However, given the relative newness of DoD's use of alternative financing mechanisms to support the development of renewable energy, the DON acknowledges that there may be circumstances under which awarded contracts and signed leases for renewable energy projects should be reviewed. For example, periodic assessments of "realized" versus expected savings could yield insights to key variables that could be applied to planning assumptions and inputs for future business case analyses.

Actions DON will take:

1. As part of the aforementioned update to relevant instructions, regulations and policy, establish parameters for the post hoc review of financed renewable energy projects to provide data for analytical and/or business process improvements. (Planned completion: TBD)

Assistant Secretary of the Navy for Energy, Installations, and Environment (cont'd)

(FOUO)

DoD IG Draft Report: "The Navy Needs More Comprehensive Guidance for Evaluating and Supporting Cost-Effectiveness of Large-Scale Renewable Energy Projects"
Project No. D2015-D000RA-0195.000
DON Technical Comments

Cmt. #	Page	DoD IG Draft Report	DON Comments
Solar Multiple Award Contract			
1.	7	<p>"NAVFAC personnel calculated the brown power cost for the first year of the contract by multiplying the minimum or maximum kilowatt-hours by a baseline kilowatt-hour rate. According to the economic analysis report, the baseline rate was computed by escalating the 2013 kilowatt-hour rate to a 2016 rate (year 1 of the contract). NAVFAC personnel calculated the brown power cost for additional contract years by multiplying the minimum or maximum kilowatt-hours by an annually escalated kilowatt-hour rate. REPO personnel provided FY 2013 utility bills and spreadsheets with historical electricity consumption data to support the 2013 baseline kilowatt-hour rate of 0.228 and the minimum and maximum kilowatt-hours. Although the bills and spreadsheets supported the 2013 baseline kilowatt-hour rate, they did not support how NAVFAC personnel calculated the minimum and maximum kilowatt-hours, which were used to determine the total cost savings."</p>	<p>The final contract minimum and maximum kilowatt hours were negotiated by the contractor and the Government during the exclusive negotiation process. They were not set solely by the Government.</p> <ul style="list-style-type: none"> A minimum amount of kilowatt-hours are necessary for the developer to mitigate its risk and support project financing. <ul style="list-style-type: none"> The FY2013 utility bills and spreadsheets with historical electricity consumption data support the agreed upon minimum because the DON evaluated its risk by comparing the minimum kilowatt-hours discussed via the negotiation process to the FY2013 utility bills and historical electricity consumption data to determine the percentage of the annual electricity load represented by the minimum kilowatt-hours. The specified minimum represented less than 5% of the annual electricity load, which meant the Navy's electricity demand would have to decrease 95% from FY2013 levels for the contractual minimum kilowatt-hours to present a risk to the DON. A maximum amount of kilowatt-hours is a function of the size and production capacity of the installed solar PV and therefore the maximum amount that the DON could receive at the negotiated contract price. <ul style="list-style-type: none"> Documentation of parameters affecting the maximum solar PV system sizes were part of the

Attachment 2

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			design requirements and covered in the terms of the contract previously provided to the DoD IG.
2.	7	<p>[REDACTED]</p> <p>However, the contractor's report did not contain a rationale for the weights assigned to each of the components. Therefore, the escalation rate is not adequately supported and could be inaccurate. An inaccurate escalation rate would result in inaccurate rates for brown power kilowatt-hours over the 25-year contract term and, consequently, an inaccurate NPV cost-savings calculation."</p>	<p>The overall weights used by the independent contractor, in the judgment of the Navy, evenly balance forecasted and historical data. The use of qualitative judgment and subjective data, in estimating costs and benefits is recognized by OMB (ref: OMB Circular A-94 (paragraph 9.a.), OMB Circular A-11 (paragraph 51.2).</p> <p>(FOUO) [REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>

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			Given the inherent uncertainty in estimating the behavior of

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			future prices, the DON believes its approach was reasonable and consistent with OMB guidance. Furthermore, in the 2922a package documentation previously provided to the DoD IG, the Navy acknowledged the sensitivity of its cost-savings calculation to the 5.7% escalation rate and identified the minimum escalation rate under which the estimated NPV of cost savings would still be positive and, therefore, cost effective.
		Guam and West Loch Projects	
3.	8	"The IKC for the Guam project is photovoltaic hardware and energy access and for the West Loch project is electrical infrastructure upgrades."	The IKC for the Guam project is suppositional pending successful negotiations. The draft's definitive characterization of the IKC is premature.
		Guam Photovoltaic Renewable Energy Project	
4.	8-9	["REPO personnel provided a market rental value document and an "IKC Estimates Valuation Brief" to support the cost-effectiveness determination for the Model 2 Guam Photovoltaic Renewable Energy project. The market rental value document included values such as a base rent and base rent escalation rate. [REDACTED] [REDACTED] REPO personnel provided "The Arizona Standard Solar Lease" template as supporting documentation for the base rent and base rent escalation rate. Although the Arizona template supported the use of a [REDACTED] base rent escalation rate, it did not support the formula used by REPO personnel to calculate the base rent [REDACTED]	The Arizona State Land Department provided their base rent formula to the Navy in an email. That email has been provided to DoD IG subsequent to issuance of the draft report.

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		<p>Specifically, the Arizona template determined the base rent using gross acreage multiplied by a fixed dollar amount, not total appraised land value.</p> <p>If the base rent is inaccurate, the land's fair market value, used to determine cost-effectiveness, will also be inaccurate."</p>	
5.	9	<p>"REPO personnel also provided a draft document called "Guam IKC: Access Valuation" to support how the energy access value was determined. In that document, REPO personnel calculated the NPV of energy access by multiplying the energy access value by an annually escalated rate, and by a discount rate to discount future cash flows to present dollar value, over the term of the lease. REPO personnel supported the escalation rate, but did not fully support the analysis for the discount rate. For the escalation rate, REPO personnel provided spreadsheets, which showed the numbers used to calculate the escalation rate and the U.S. Energy Information Administration website used to obtain the numbers. In support of the discount rate, REPO personnel provided a real estate investor survey, which included a range of discount rates published by the Appraisal Institute.</p>	<p>The DON believes that the discount rate used in the evaluation of the Guam project is reasonable and consistent with industry practice. Adjustments to the range of discount rates found in the market for those properties/uses were estimated and applied to consider lessor and lessee risk for a one-time lump sum payment.</p>

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		[REDACTED]	
		West Loch Photovoltaic Power Renewable Energy Project	
6.	10	"As with the Guam Photovoltaic Renewable Energy project, REPO personnel provided "The Arizona Standard Solar Lease" template as supporting documentation for the base rent escalation rate and base rent. The Arizona template supported the use of a [REDACTED] base rent escalation rate, but not the base rent. [REDACTED] [REDACTED]. However, the Arizona template did not support the formula used to calculate the base rent [REDACTED]"	The Arizona State Land Department provided their base rent formula to the Navy in an email. That email has been provided to DoD IG subsequent to issuance of the draft report.
		Navy Guidance Lacked Specificity and Documentation Requirements	
7.	10	"Navy guidance does not include detailed steps for evaluating cost-effectiveness of renewable energy projects and does not require that supporting documentation be maintained."	For Model 1 and 3 projects, DOD Instruction 4170.11, page 16 specifies the form of analysis prescribed by the OSD. With respect to Model 2 projects, NAVFAC P-73 Chapter 16 provides standards for the conduct of appraisals to determine the fair market value. In addition, OASN (EIE) memorandum ("Shore Energy Policy Real Estate Out-grant Guidance for Renewable Energy Program Office Model 2 Projects," dated March 31, 2015) discusses valuation of in-kind consideration for renewable energy projects. FAR 4.803 and SECNAV M-5210.1 provide contract file and document retention policies that require the Contracting Office to maintain all such

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			records.
8.	11	<p>“However, these policies and procedures do not include detailed guidance for</p> <ul style="list-style-type: none"> • evaluating cost-effectiveness of large-scale renewable energy projects, such as guidance on: • identifying a formal, written definition of cost-effectiveness for each model type; • developing formal steps for assessing cost-effectiveness throughout the project; • documenting assumptions made during each phase of the project, such as details on conducting a business case analysis, load and resource analysis, and market analysis; • documenting the basis for concluding that the renewable energy is cost-effective; and • maintaining project documentation, including support for cost-effectiveness assessments.” 	<p>DOD Instruction 4170.11, at page 16 specifies the meaning and required analysis for cost-effectiveness for Models 1 and 3 projects: “Award determinations shall be based on best value and, where applicable, compared to the applicable utility tariff available under a utility services contract to ensure economic value.” Any additional guidance would need to be coordinated with and approved by the OSD. NAVFAC P-73 Chapter 16 provides standards for the conduct of appraisals to determine the fair market value. In addition, OASN (EIE) memorandum (“Shore Energy Policy Real Estate Out-grant Guidance for Renewable Energy Program Office Model 2 Projects,” dated March 31, 2015) discusses valuation of in-kind consideration for renewable energy projects.</p>
No Assurance of Accurate Cost-Effectiveness Assessment			
9.	11	<p>“Without comprehensive guidance on how to evaluate and document the cost-effectiveness of large-scale renewable energy projects, the Navy lacked assurance that the cost-effectiveness assessments for the projects were accurate, and that appropriate investment decisions were made.”</p>	<p>DOD Instruction 4170.11 provides guidance on how to evaluate and document the cost-effectiveness of large-scale renewable energy projects. All such assessments are retained in the contract files in accordance with FAR and DON policies on maintenance of contract files and records retention (see FAR 4.803 and SECNAV M-5210.1).</p>
10	12	<p>“For example, the Navy awarded the Solar Multiple Award Contract, a 25-year fixed-rate contract with a \$334.1 million ceiling—a contract that locked the Navy into a fixed rate per kilowatt-hour for the 25-year term—without fully supporting how they determined that the renewable energy project was</p>	<p>The DON provided the economic analysis, detailed supporting documentation and source data (including utility bills) that concluded the Solar Multiple Award Contract was cost-effective.</p>

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		cost-effective.”	
11	12	<p>“NAVFAC personnel stated that since the contract is for the purchase of power only, and the Navy will not own and maintain any of the assets, this contract represented minimal risk. [REDACTED]</p> <p>“[Footnote 28] [REDACTED]</p>	<p>[REDACTED] First DON will enjoy fixed prices on renewable energy in Hawaii for the 25 year contract term. Based on historic energy pricing data (last 15 years), the average energy price escalation rate in Hawaii was 7.5%. The independent contractor report, which is forward-looking, projected an average energy price escalation rate in Hawaii of 5.7%. Actual energy price escalation in Hawaii may be much higher than projected. The contract for the Solar MAC project provides for a 4% energy price escalation rate. Accordingly, the risks of a 25 year contract term are more than matched by the long-term price stability offered by the contract. Second, while the contract requires a minimum level of service, the amount of power provided under the contract is less than 5% of base load at the DON installations. The DON is satisfied that it will consume at least 5% of its current base load power in Hawaii for the 25 year contract term.</p> <p>[REDACTED]</p>
12	12	<p>“Based on our review, the contract did not include a clause for reassessing cost-effectiveness after the project starts generating energy.”</p>	<p>Upon award of the contract and the completion of construction, the DON would be responsible for construction costs in a termination scenario. In other words, these are “sunk” costs. There is no need (or requirement) for a cost-effectiveness analysis after the project starts generating energy.</p>

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			because there would be no foreseeable situation in which the DON would terminate the contract based on variations in market price. It should also be pointed out that such a clause could work against the DON's favor if the contractor were similarly allowed to re-assess and revise its prices in the event of an increase in market prices.
13	12	“If a reassessment concluded that a project was not cost-effective and the contract should be terminated, termination liability costs would apply. Per the contract terms for the Solar Multiple Award Contract, termination liability costs range from \$0.4 million to \$74 million for each of the 14 sites if the Navy terminated the contract during the first month the contractor starts selling electricity to the Navy.”	It is standard in long term renewable energy contracts that the purchaser of power is responsible for costs of early termination. The likelihood that the Navy would opt to terminate the contract in the first month of commercial operation is nil. Therefore, the statement is meaningless.

Acronyms and Abbreviations

AOR	Area of Responsibility
IKC	In-Kind Consideration
NAVFAC	Naval Facilities Engineering Command
NPV	Net Present Value
REPO	Renewable Energy Program Office
USPACOM	U.S. Pacific Command



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